

Star, Oct. 7, 1949. Other sources are *Cong. Directory*, 80th Cong., 1st Sess. (1947), p. 346, *Who Was Who in America*, II (1950); *Biog. Directory of the Am. Cong.: 1774-1961* (1961); *Cong. Record*; and *Annual Report of the Postmaster General*, 1946. Assistance of Roy T. King, Mary Mewes, and William Pettus of St. Louis gratefully acknowledged. Personal recollection.]
IRVING DILLIARD

HANSEN, NIELS EBBESEN (Jan. 4, 1866-Oct. 5, 1950), horticulturist and plant explorer, was born on a farm near Ribe, Denmark, the youngest of three children and only son of Andreas Hansen and Bodil (Midtgaard) Hansen. His father, a mural decorator and altar painter, immigrated to the United States in 1873. After living for three years in New York and New Jersey, he settled his family in Des Moines, Iowa, where he found work in the decoration of the new state capitol building.

Niels Hansen showed an early interest in nature and took long walks in the woods collecting natural history specimens. At Iowa State College at Ames, he was influenced by Joseph L. Budd, head of the department of horticulture, and after receiving the B.S. degree in 1887, he spent several years working for commercial nurseries in Iowa. In 1891 he returned to Iowa State College as assistant professor of horticulture, and in 1895 received an M.S. degree. That same year he was named professor of horticulture at the South Dakota State College in Brookings and a staff member of the Agricultural Experiment Station there, positions that he retained until his retirement in 1937.

Hansen was responsible for the introduction and development of new varieties of grains, forage crops, and fruits in the Western prairies and Great Plains of the United States. Much of his work involved a search for fodder plants that could withstand the cold, dry climate of this region. Early in his career he established the principle that hardiness could not be bred into plants by selection alone, but rather through hybridizing (cross-breeding) with existing cold-resistant strains. Beginning in 1894 he made several trips to northern Europe and Asia seeking suitable plants. On one such trip in 1897, made at the request of Secretary of Agriculture James Wilson, who had known him at Iowa State College, Hansen discovered the bacterial-wilt-resistant, blue-flowered Turkestan alfalfa, suitable for a cold, northern climate. On later trips, undertaken for the Department of Agriculture or for the state of South Dakota, he collected the yellow-flowered alfalfa, which grew even farther north, and discovered a natural hybrid of the blue and yellow varieties. He also

brought back seeds and plants of many other types, including crested wheat grass, which became a major forage crop on the northern American plains. He also brought with him the Siberian fat-rumped sheep.

Hansen carried on experiments in hybridization and selection at his horticultural plant at Brookings, which included one of the world's first greenhouses for fruit breeding. Here he originated Hansen hybrid plums and improved many varieties of such fruits as apples, pears, grapes, and melons for growth in the prairies and plains. Hansen's worldwide reputation led the Lenin Academy of Agricultural Sciences to invite him in 1934 to the Soviet Union to advise on agriculture and horticulture.

During his long and productive life, Hansen received many honors and awards, including the George Robert White Gold Medal "for eminent service to horticulture" from the Massachusetts Horticultural Society (1917) and the Marshall P. Wilder Silver Medal "for new fruits" from the American Pomological Society (1929). Hansen was married twice: on Nov. 16, 1898, to Emma Elise Pammel, sister of Louis H. Pammel, head of the botany department at Iowa State College; and after her death in 1904, to her sister, Dora Sophie Pammel, on Aug. 27, 1907. He had two children by his first marriage, Eva Pammel and Carl Andreas. Hansen died in Brookings of chronic myocarditis at the age of eighty-four and was buried in that city's Greenwood Cemetery.

Broad in his interests, patient and philosophic by temperament, Hansen believed that man could succeed by working with nature. Although he once modestly referred to the horticulturist Luther Burbank as the "master of us all," he had himself enriched the prairies and the plains with new varieties of alfalfa, wheat, millet, and fruits.

[Niels E. Hansen, "Fifty Years Work as Agricultural Explorer and Plant Breeder," *Iowa State Horticultural Soc. Trans.*, 79 (1944): 28-49; Mrs. H. J. (Rose) Taylor, *To Plant the Prairies and the Plains: The Life and Work of Niels Ebbeesen Hansen* (1941); and three articles by William P. Kirkwood: "The Romantic Story of a Scientist," *World's Work*, Apr. 1908; "The North Pole of Alfalfa," *Outlook*, May 28, 1910; and "Hansen, America's First Plant Explorer," *Rev. of Reviews*, Oct. 1913. See also *Who Was Who in America*, III (1960). Death record from S. Dak. State Dept. of Health.]

WAYNE D. RASMUSSEN

HANSEN, WILLIAM WEBSTER (May 27, 1909-May 23, 1949), physicist, was born in Fresno, Calif., the older of two surviving sons of William George Hansen and Laura Louise (Gilligly) Hansen. His paternal grandfather

had immigrated to the United States from Denmark after the German annexation of Schleswig-Holstein. His mother, the daughter of a non-Mormon missionary to Utah, encouraged her children to be independent. Hansen as a boy showed a precocious interest in electrical devices and a special aptitude for mathematics. From his father, a hardware merchant, he acquired a familiarity with and love for machine tools. He completed his high school course in two years, at the age of fourteen, but stayed on for an additional year at the Fresno Technical High School before entering Stanford University in 1925. Except for one year at Fresno State College, he remained at Stanford, where he began studying electrical engineering but shifted to physics; he received the A.B. degree in 1929 and the Ph.D. in January 1933. Appointed a National Research Fellow, he spent eighteen months studying at the Massachusetts Institute of Technology and at the University of Michigan, and returned to Stanford in 1934 as assistant professor of physics. He was made associate professor in 1937 and professor in 1942.

At M.I.T., Hansen became interested in mathematical methods of analyzing emission and absorption of atomic radiation. At the time of his return to Stanford, plans were being made for research on atomic nuclei by bombarding them with particles accelerated to energies of about a million volts. Hansen proposed to attain this voltage by means of electromagnetic resonance at very high radio frequencies, using a cavity resonator that he conceived for the purpose. The "rhumbatron," as he called it, was to consist of a hollow space bounded with copper walls. Just as Hansen was well started on the design of such an accelerator, his close friend Russell H. Varian saw the possibility of using two rhumbatrons as resonators in a new device—which he called the "klystron"—to generate radio frequency energy at very short wavelengths. Hansen's interest was challenged, and he quickly designed and built a tube that demonstrated Varian's ideas to be highly practical. For the first time (1937), a substantial amount of "radio" energy became available at wavelengths of the order of 10 cm. One immediate practical application of the klystron was the use of reflected radio waves to locate aircraft, the system now called radar. A group headed by Hansen and Varian, with support from the Sperry Gyroscope Company, vigorously pursued this concept at Stanford until early in 1941, when they moved east to Sperry's plant on Long Island.

With the increasing probability of American entry into World War II, the klystron research took on new importance. Promptly after his arrival in the East, Hansen was invited to M.I.T.'s Radiation Laboratory, which had been formed the previous fall to exploit the possibilities of microwave radar. From then until the end of the war he commuted between Cambridge and Long Island almost every week, while simultaneously carrying full-time responsibility in Sperry's microwave radar program. At the Radiation Laboratory, Hansen performed a unique role. The laboratory's leadership consisted of a group of brilliant physicists and engineers who had worked on cyclotrons and X-rays, but who in general knew little or nothing about microwaves. In a very real sense, Hansen became their tutor, at weekly lectures and informal conferences. In the summer of 1943 he also spent some weeks at the University of California as consultant on aspects of atomic energy problems for the Manhattan Project.

After the war ended, Hansen returned to Stanford as director of the microwave laboratory being established there. In the first months he took time out from his own research to help in an investigation being carried out by Felix Bloch, a Stanford colleague. Hansen devised the instrumentation Bloch used in discovering the existence of nuclear magnetic resonance and made many valuable suggestions that contributed to the successful demonstration of the method of nuclear induction in 1946. Bloch subsequently (1952) received the Nobel Prize for work in this field.

Hansen realized that the microwave technology he had helped create could be used to make an electron accelerator far superior to anything he had dreamed of a decade earlier, when he invented the cavity resonator. A relatively short accelerator built in the spring of 1947 proved the soundness of his underlying ideas and was soon followed by a longer section. Late in 1948 the Office of Naval Research agreed to finance the construction of a linear accelerator 220 feet in length, designed to produce about 750 million electron volts. In early 1949 Stanford started construction of a building to house this machine, with its associated shops, laboratories, and offices. Finished after Hansen's death, it became the model for Stanford's later 10,000-foot, \$110 million linear electron accelerator.

Hansen possessed a remarkable spectrum of talents well exemplified in his twenty-nine published papers. He had great originality, and his inventiveness always had a practical quality.

He was an excellent theoretical physicist but, unlike most theoreticians, was also skilled with apparatus, had extraordinary knowledge of shop processes, and superb ability as a design engineer. His pioneering contributions to the technology of microwave electronics resulted from this unusual combination of qualities. He was also an excellent classroom teacher, whose lucid and stimulating lectures excited even the Ph.D. physicists at M.I.T.'s Radiation Laboratory. The value of his work was recognized by the award of the Morris N. Liebmann Prize of the Institute of Radio Engineers in 1945 and by his election to the National Academy of Sciences in 1949.

On Oct. 18, 1938, Hansen married Betsy Ann Ross, the younger daughter of Prof. Perley A. Ross of Stanford, with whom he had collaborated in X-ray studies as a graduate student. Their only child, a son born in 1947, died six weeks after birth. Since his youth Hansen had suffered periods of illness, the result of bronchiectasis and fibrosis of the lungs. The disease was progressive, and he died of a heart attack at his home on the Stanford campus a few days before his fortieth birthday. His ashes were scattered from an airplane over the Golden Gate area.

[A more extensive biography of Hansen by Felix Bloch, with a complete bibliography, appears in *Nat. Acad. Sci. Biog. Memoirs*, XXVII (1952). There is relevant material in the archives of Stanford Univ., especially a brochure, *The Uncommon Man* (1951).]
FREDERICK E. TERMAN

HARBORD, JAMES GUTHRIE (Mar. 21, 1866-Aug. 20, 1947), army officer and corporation executive, was born near Bloomington, Ill., the oldest of three children and only son of George Washington Harbord, a farmer of modest means, and Effie Critton (Gault) Harbord. His father's forebears had come from Virginia and had lived in Kentucky before settling in Illinois in 1823. The Gaults had migrated from Maryland to Pennsylvania and then to Ohio, where his mother was born. During James's boyhood his family moved to Pettis County, Mo., and in 1878 to Lyon County, Kans.

An avid reader, James was encouraged by his parents to continue his education beyond the local schools. He entered Kansas State Agricultural College, where he learned telegraphy and typewriting. He had planned to be a telegrapher, but the military training he took as an undergraduate made him decide to become a professional soldier. Upon graduating with the B.S. degree in 1886, he tried unsuccessfully to obtain an appointment to the United States Mil-

itary Academy at West Point, and in January 1889, after an interim of teaching, he enlisted as a private in the 4th Infantry Regiment.

Harbord's skill as a typist, a rarity in the army at that time, brought him rapid promotion through the ranks to quartermaster sergeant. In August 1891, after passing the required examinations, he became a second lieutenant in the 5th Cavalry Regiment. He graduated from the Infantry and Cavalry School in 1895 and earned the M.S. degree at his alma mater the same year. During the Spanish-American War, Harbord served as a major in the 2nd Volunteer Cavalry ("Torrey's Terrors"), a cowboy regiment organized in Wyoming, which did not see combat. Meanwhile, promotion in the regular army to first lieutenant (July 1898) brought about his transfer to the 10th Cavalry, where in the fall of 1899 he met and formed a friendship with a senior first lieutenant, John J. Pershing.

After a round of administrative assignments in Cuba and in Washington, D.C., Harbord, by this time a captain, went to the Philippines in 1902. The next year he became an assistant chief of the Philippine Constabulary with the equivalent rank of a colonel. This position provided an unusual opportunity to exercise authority and responsibility far beyond that of a cavalry troop commander. He was most successful in his first mission of increasing the constabulary by recruiting the warlike Moros and remained on this duty until January 1914, when he was assigned to the 1st Cavalry. Promoted to major in December 1914, he entered the Army War College; he was a student there when the United States entered World War I in April 1917. It is a significant indication of his reputation that Theodore Roosevelt selected him as one of the three brigade commanders for his projected volunteer division.

On May 15, 1917, Harbord was named chief of staff to General Pershing, the newly designated commander of the American Expeditionary Forces. Over the next twelve months he helped his commander pick and organize a staff, then plan and supervise the development of the A.E.F. Decisive, frank, and completely loyal to his chief, he performed an invaluable service. Two brief but important combat assignments followed. In May 1918 Harbord—a brigadier general since the previous August—took over command of the Marine brigade in the 2nd Division and led it during the victorious battle of Belleau Wood, one of the most famous battles in Marine Corps history. In July, newly promoted to major general, he was given command